

Drivers for implementation of smart home technology in NL

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Agenda

- Introduction
- Smart houses & smart living
- Experiences with smart home implementation
- Barriers and challenges
- Smart meters
- Persuasive technology
- Conclusions



What is smart home technology

- Integration of technology and services for better quality of housing and living
- Types of smart houses:
 - houses with “intelligent” objects
 - houses with some “intelligence” and communicating objects
 - connected houses
 - learning and reacting houses
 - anticipating houses



Evolution of “smartness” in telecare

	Tradit. telecare (alarms & monitoring)	Smart houses (Domotics)	Fixed + mobile intelligence
1st generation	Social alarms	Social alarms + sensors + actors	Smart house + independ. robot
2nd generation	Social alarms + sensors + telemonitoring	Connected sensors + actors+ some intelligence	Smart house + integrated robot
3rd generation	Social alarms + sensors + telemonitoring + context awaren.	Connected sensors + actors+ intelligence + context awaren.	Smart house + integrated autonomous robot + context awaren.



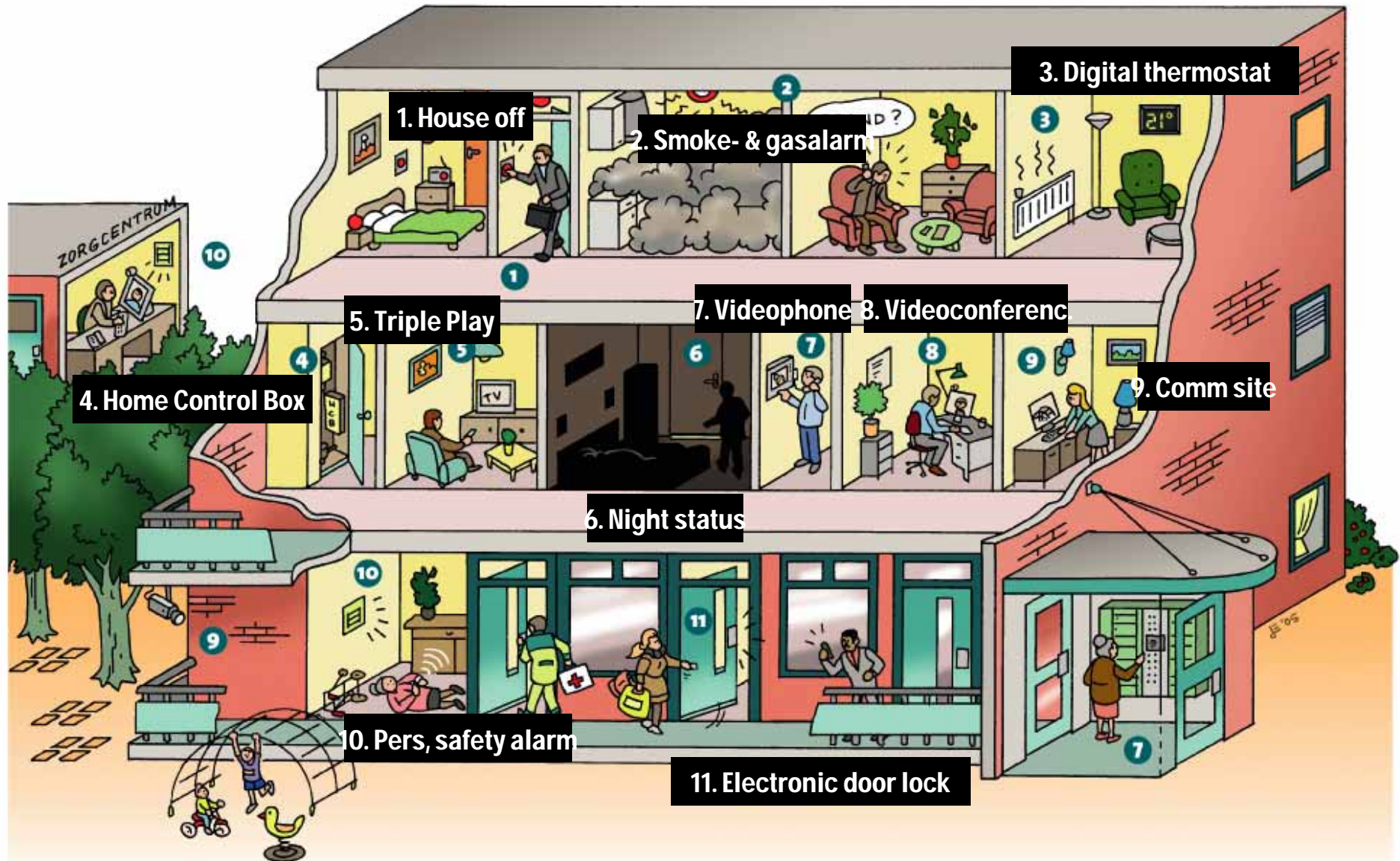
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Trends

- **Socio-economic trends: ageing of society and increasing costs of energy**
- **Technological trends**
 - Internet of things
 - Context awareness
 - Increasing networking capacity
 - Increasing broadband (fixed and mobile)
 - Robotics
 - Advanced recognition (emotion, gestures, etc.)
 - Embedded systems
 - Nanotechnology/Biotechnology



Current “Ageing well at home” applications



What has been achieved in NL (7 million houses)?

- For supporting older people in apartment flats:
 - flats with 20 - 60 apartments
 - estimated numbers in NL:
 - 5.000 integrated smart homes for older people (new built)
 - 25.000 apartments with telecare solutions
- More efficiency in home care for older people:
 - 5000 individual houses with screen to screen care
 - 2500 telemonitoring of vital signs
- For comfort, luxury and comfort in high-end houses:
 - 5000 expensive villa's

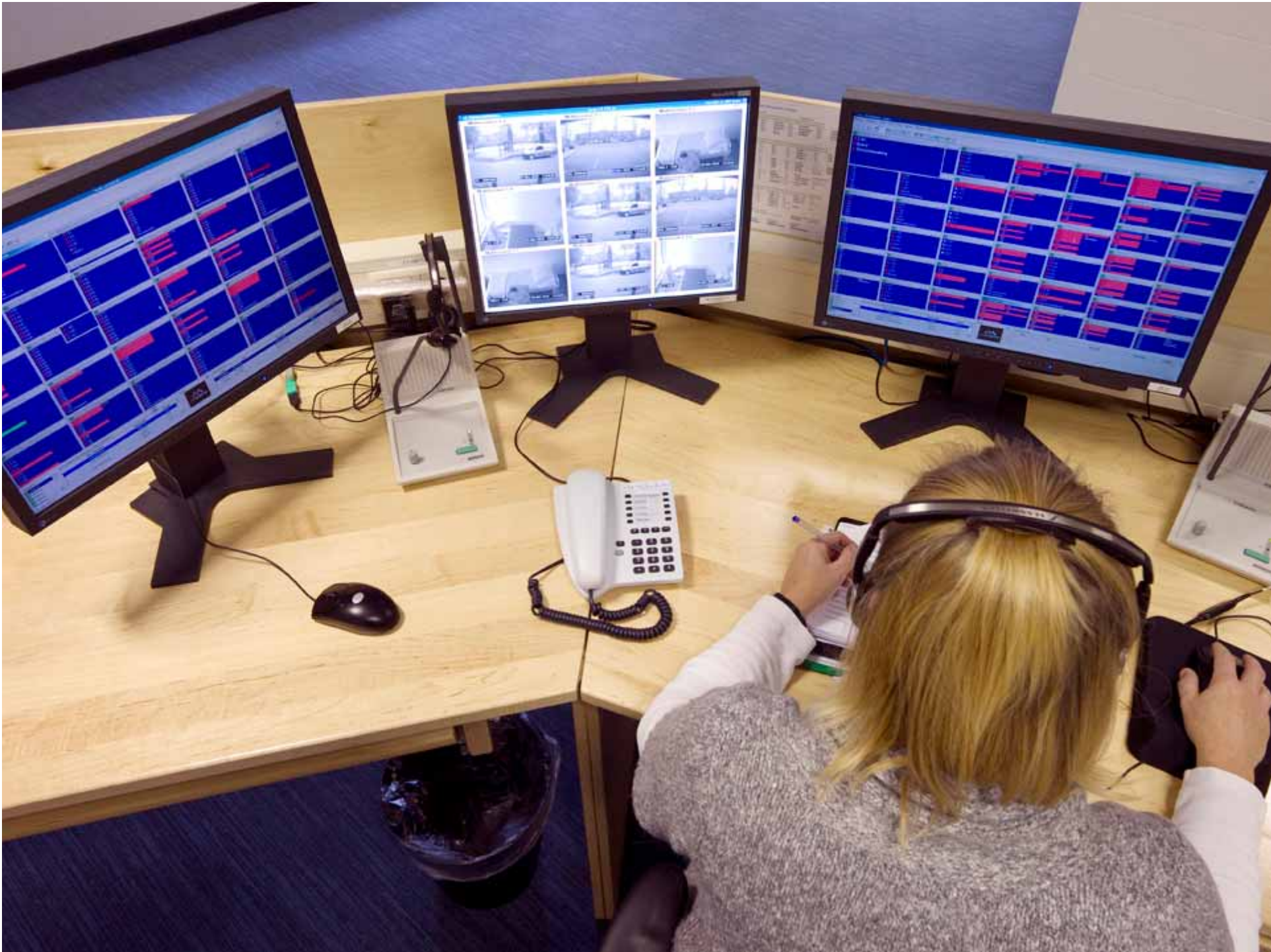


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What has been achieved in NL (120.000 res. + 130.000 nursing home places)?

- For remote monitoring of (demented) older people in nursing homes and residential apartments:
 - Estimated in NL: 40.000 – 50.000 bed maths, infrared detectors, sound monitoring and camera monitoring
- More efficiency in monitoring (at night) of persons with mental disabilities in small scale group living:
 - 50.000 rooms with sound monitoring (camera's)





Barriers and challenges

- Interoperability and standardisation still big issues;
- Not enough skills in installation business;
- Installers traditionally from electro technical mono discipline;
- Consumer not aware of possibilities and opportunities;
- Basic control system relatively expensive;
- Human – machine interaction permanently underestimated.



What is interoperability?

- There are multiple “layers” of interoperability:
 - Protocol interoperability: the ability to exchange bits & bytes over a network
 - Syntactic/functional interoperability: the ability to exchange messages/data in a well-known format
 - Semantic interoperability: the ability to provide a common understanding (semantics) of the data exchanged
 - User perceived interoperability: components of a system communicate with one another effectively, correctly and provide the expected services to the user.
- User perceived interoperability is what we need, but all other layers are necessary preconditions!



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Energy management

- From early nineties up to 3-4 years ago: energy saving was not really an issue;
- How can smart houses contribute to saving:
 - Automatic switch off of equipment and lighting; lower heating at absence;
 - Use of equipment only when energy is cheapest;
 - Smart metering: measuring in detail, giving feedback to user – social feedback better than factual feedback;
 - Use of persuasive technology to strengthen feedback by smart metering.




Pulse counter for gas and electricity: factual use, history + nominal value of a reference house

ACTUEEL Dinsdag 13 april 2010

12:33

VERBRUIK


272 W



Electriciteit


+


0 W



Gas

=

55 




CO2

13°C


30°C

Wo



4/15

Do



2/15


= € 0,00


JAAR

– kWh


– m3

– kg







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Besparing




Historie




Energie tip!



Meter stand



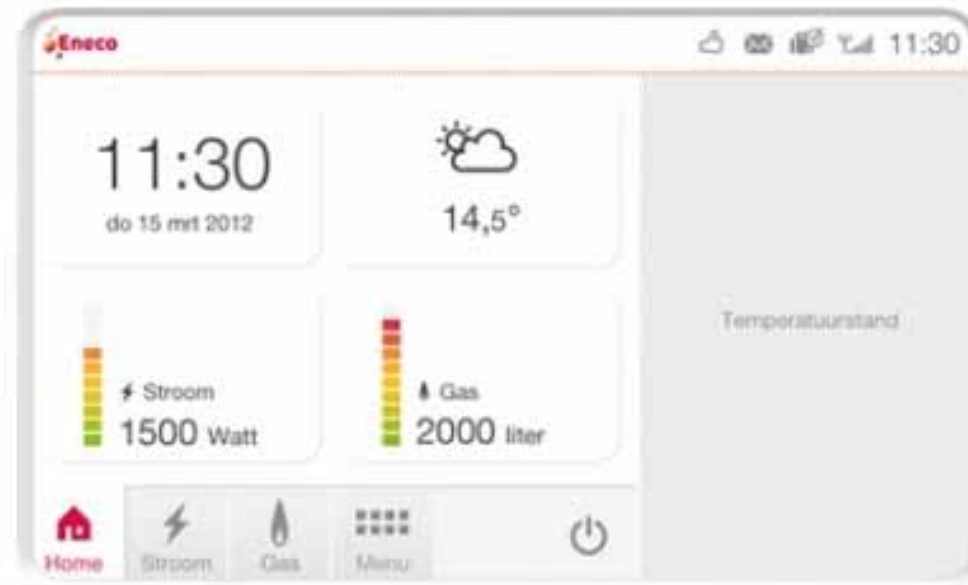
Opwek



Nest (Apple): 6 sensors for temperature, movement, light and humidity. Takes about a week before thermostat knows how one lives for adapting the heating. Also abnormal situations are recognised.



Toon (Eneco)



E-thermostaat (Essent)



Domovea (Hager)



Feedback via an avatar



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Feedback via an avatar

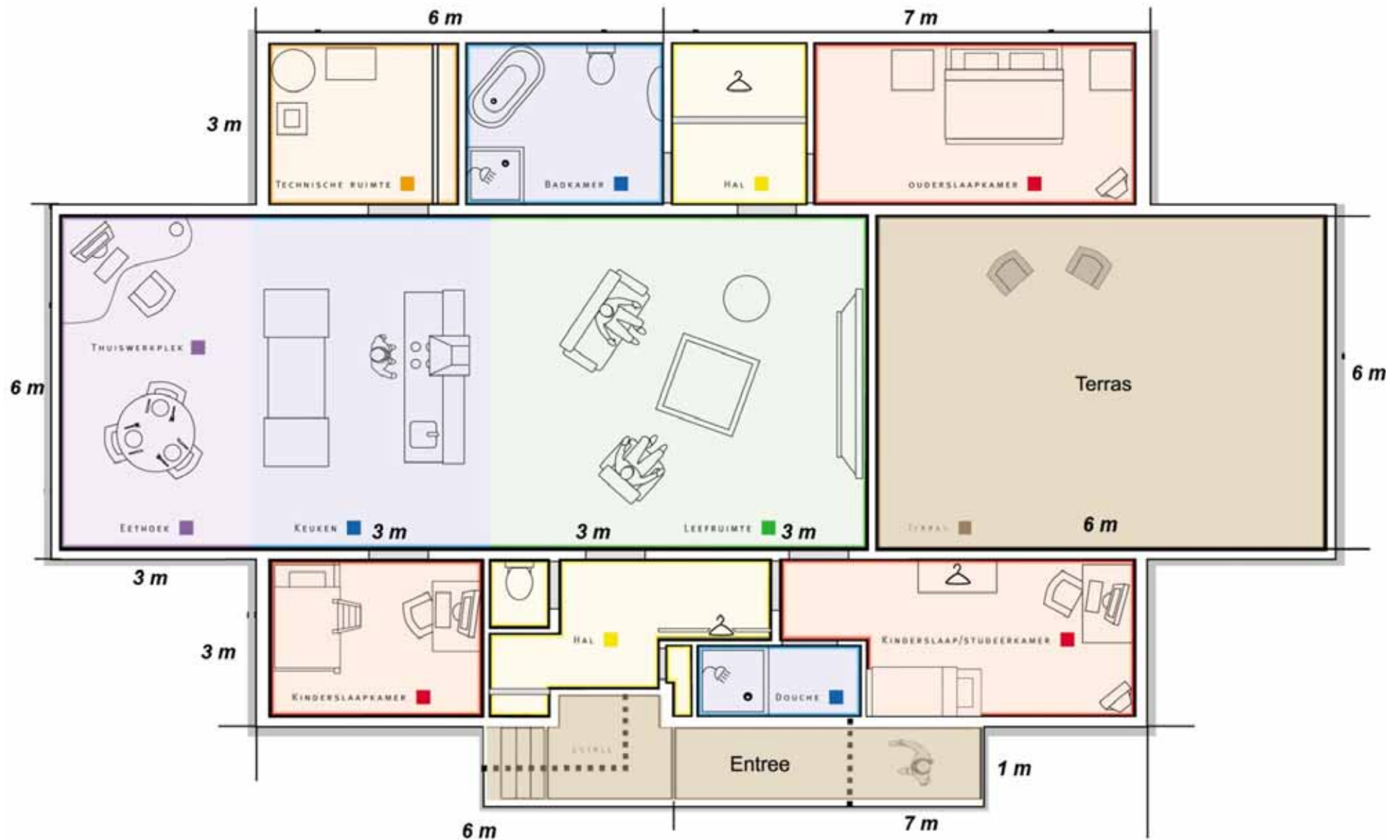


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The Smartest House of the Netherlands



Floor plan



Kitchen and living room



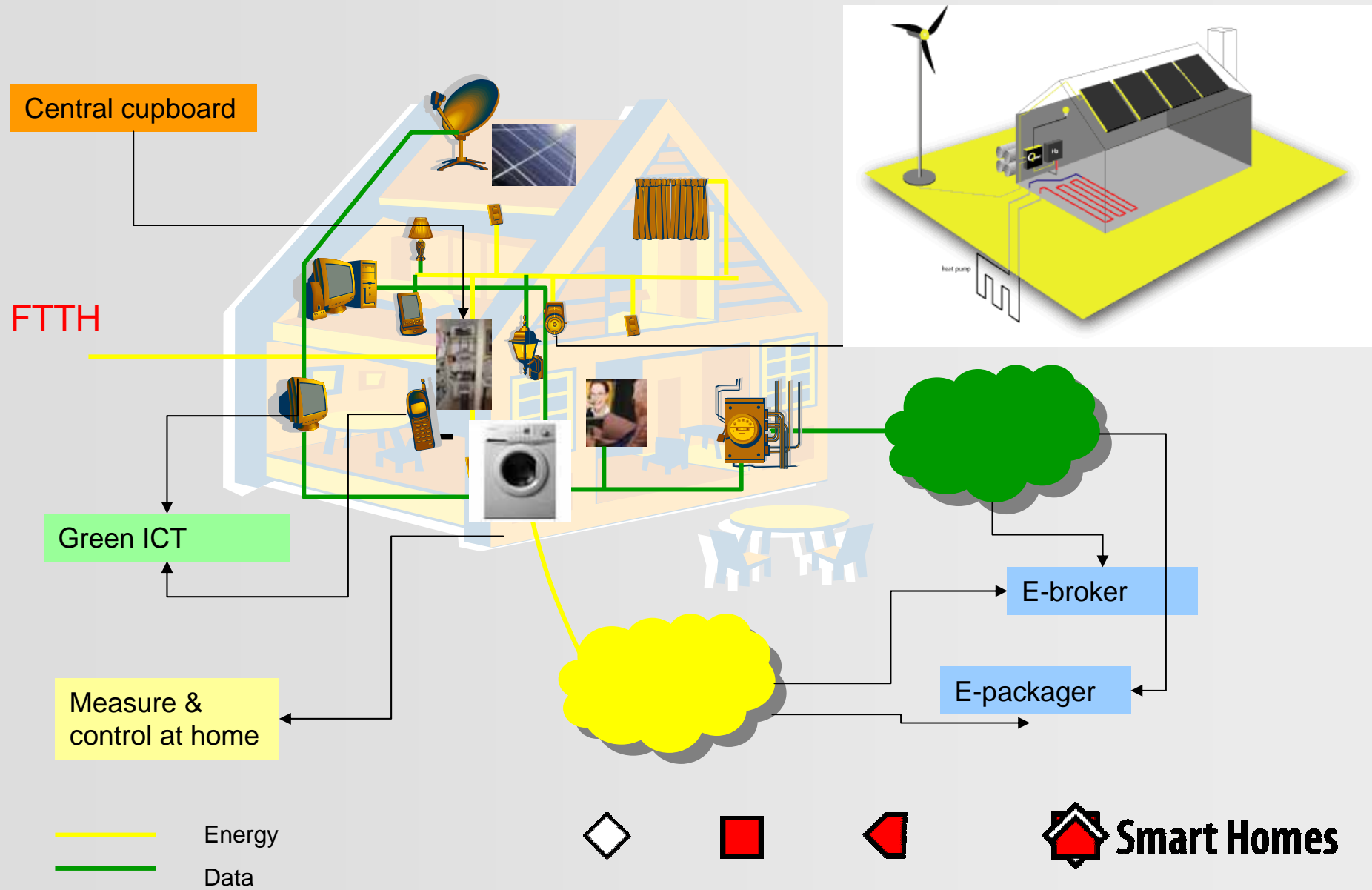
Future challenges

- Research: real smart house for optimal energy use and support of the resident;
- Interoperability: competition versus cooperation
- Industry: large companies versus SME's
- Costs: mass markets versus niches
- Care area: social + medical care (reimbursement) versus more consumer investments
- Energy area: interests of large oil companies + government versus private households;



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Vision: connection care-energy with big data leading to unforeseen new opportunities and new players



Conclusions

- Smart house developments have taken long way but are taking off rapidly now;
- There are still lots of barriers to overcome before mainstream implementation will take place;
- In care: business case may need a total different approach, far from the medical/care models;
- In energy: upcoming strong business case and therefore key driver for breakthrough;
- Smart houses will become transparent houses with big data and “controlled” living and therefore special attention is needed for privacy and ethical issues.

